Improving Information Exchange and Coordination amongst Homeland Security Organizations

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Outline

- Motivation
- Practicalities of Emergency Management (EM)
- Technological support
- Opportunities for improvement
- The Vista concept
- Current status & future plans

Motivation

- The need for effective coordination
- Concerted effort to provide new resources
- Encouraging information exchange, but several complications remain:
  - Continued problems due to a lack of unified and hierarchical command
  - Lack of system and semantic interoperability amongst Homeland Security (HLS) organizations
  - Lack of practice

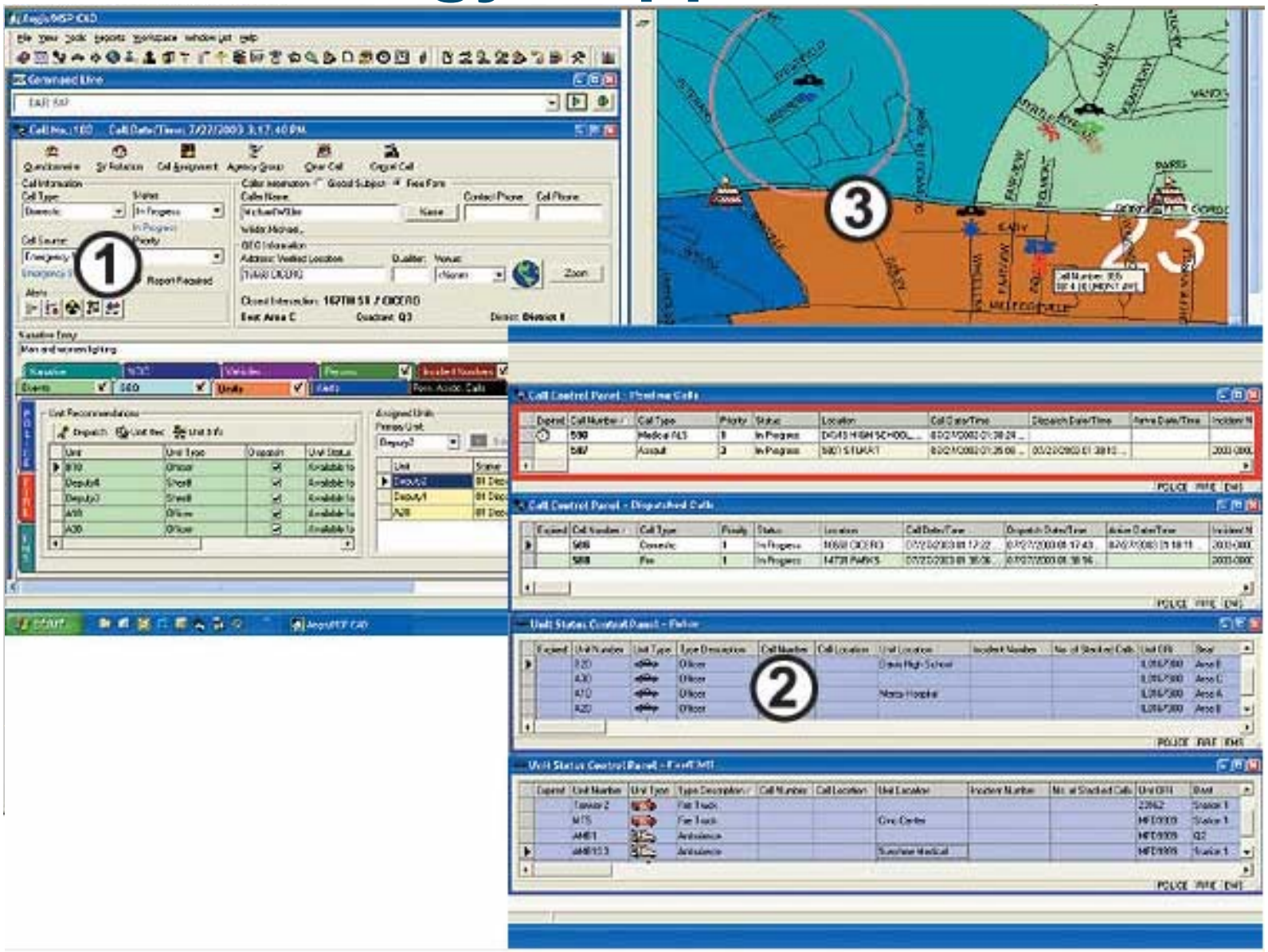
HLS Operations from the EM Perspective

- Gathered knowledge from decision makers with EM organizations in Washington State
  - City, County & State (National Guard)
- Breadth of coordination
  - Home Rule States
  - Non-government organizations
- HLS and All-Hazards EM
- Personnel characteristics
  - Infrequent exercises, changes in personnel, low levels of training

EM Concept of Operations

- Forewarning of an event (Phase I Alert)
  - EOC watch standers will monitor the situation
- The EOC is activated (Phase II Alert)
  - Department lacks sufficient resources
  - Involved departments meet at the EOC
- The EOC is fully activated (Phase III Alert)
  - Full resources are applied
  - Requests can be made to state

Technology Support



TOPOFF 2

- Communications challenges
  - heavy use of hand written information transcription and fax communication caused several errors
  - confusion over WMD device time and plume path
  - lack of shared terminology
- No shared knowledge of capabilities / resources
- Multitude of “control nodes”
  - Joint Operations Center failure

Opportunities to Improve / Our Goals

- Streamlining information monitoring/access across organizational boundaries
  - timely alerting in emergency response
  - support for everyday activities
- Supplying User Defined Operational Picture (UDOP)
  - individualized display of common data
- Reducing the need for co-location
- Enhanced joint training

The Vista Concept

- Compliments current Crisis Information Management System (CIMS) technologies

1. Exploit unfolding mission context to understand information requirements
2. Provide users with an ongoing awareness of the information being generated across partners
3. Continually adapt in order to maintain semantic interoperability

Work-Centered Mission Context Modeling

- Context understanding
  - relevancy-rated documents
  - situation data interpreted through a shallow model of EM processes
  - task vocabularies
- Federated information monitoring/access
  - multi-search & context-based filtering/prioritization
  - improves sharing efficacy in a broad set of tasks
  - foundation for UDOP

Achieving Semantic Interoperability

- Goals
  - allow partner organizations to utilize their own systems
  - support sharing and automated interpretation of “OPORD’s” and intelligence
- Two reasonable approaches to semantic interoperability
  - Hybrid ontological approach
    - semantics of each source described by its own ontology
    - map to and from a central ontology (i.e., shared vocabulary)
  - Just-in-time and ad-hoc “concept switching”
    - exploit context awareness to automatically locate (and locally) align vocabulary to support task

Context-Aware Search and Monitoring

- Two primary modes of information access
  - “goal-driven” mode where the individual seeks to fill fairly well understood information needs
  - “knowledge surveillance” mode where the individual seeks to maintain an awareness of information being generated elsewhere
- Context-aware relevance judgments vs. keyword filters
- Multi-search

Experiments & Results

- Context-aware search with multi-search
  - control group: 4 queries
    - saw 56% increase in highly relevant results in 2nd half
  - experimental group: 2 queries + 2 automated queries
    - saw 127% increase in highly relevant results
- Concept switching in search
  - 2 communities with different terminology
  - tested the utility of selectively “sharing” vocabulary
  - averaged 27% gain in relevant results with sharing

Lessons Learned

- Supporting All-Hazards EM is necessary
  - the more tools see everyday use, the more effective they will be in a crisis
- Substantial effort spent in info. monitoring
  - critical information is not always pushed to where it is needed
- EM C2 is considerably different than military C2 in most situations
- Context-aware search/filtering & “concept switching” offer substantial benefits

Current Status & Future Plans

- Project has entered a second phase of R&D
  - focus is deploying and testing tools
- Consensus amongst user organizations was reached on the need for user-defined dashboard
  - automated monitoring of web data sources
  - task driven data aggregation and display
- Working toward automated processing of task, resource, and intelligence updates